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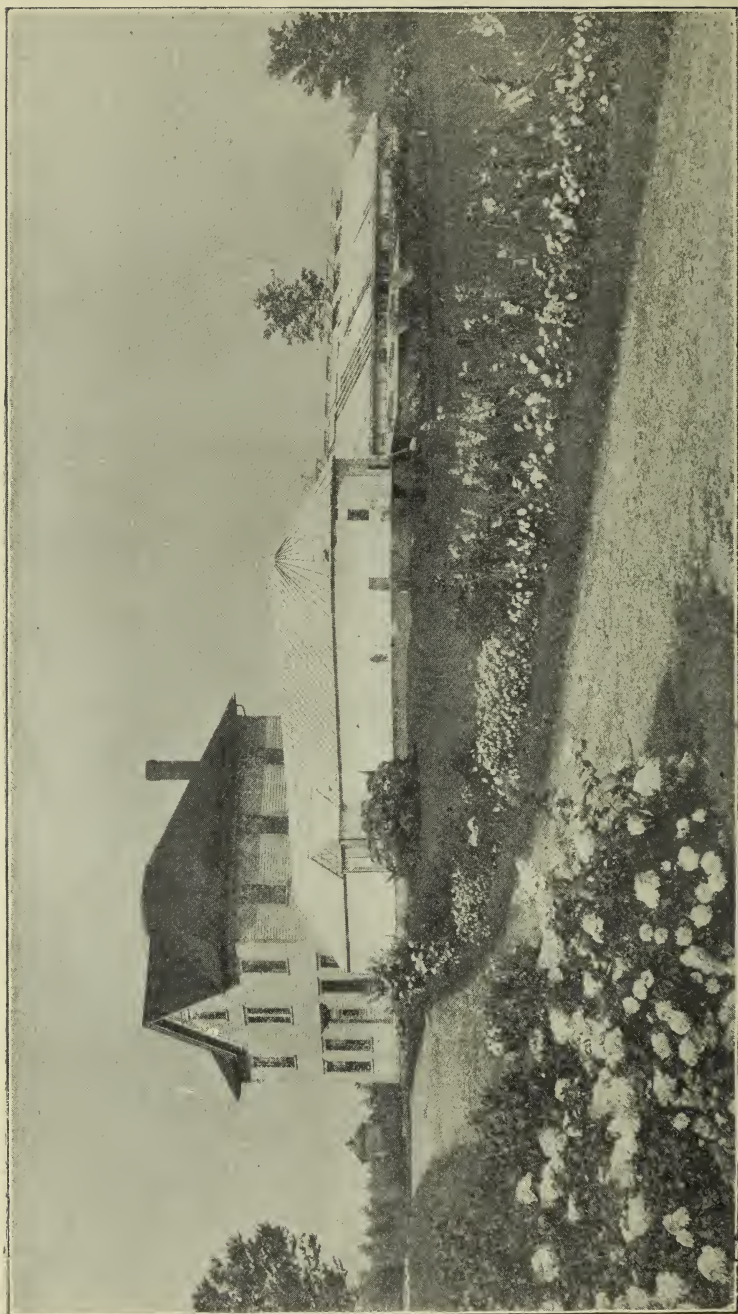
University of Maine College of Agriculture



Horticulture at the University of Maine

"I praise New England because it is the country in the world where is the freest expenditure for education*****The poor man whom the law does not allow to take an ear of corn when starving, nor a pair of shoes for his freezing feet, is allowed to put his hand into the pocket of the rich, and say : 'You shall educate me, not as you will but as I will ; not alone in the elements, but, by further provision, in the languages, in sciences, in the useful and in the elegant arts.' The child shall be taken up by the State, and taught at the public cost, the rudiments of knowledge, and, at last, the ripest results of art and science."—*Ralph Waldo Emerson.*

TUITION FREE



HORTICULTURAL BUILDINGS, UNIVERSITY OF MAINE.

HORTICULTURE AT THE UNIVERSITY OF MAINE

BY W. M. MUNSON

The College of Agriculture of the University of Maine is a group of departments whose aim it is to further the cause of agricultural education in the State. It comprises the departments of Agriculture, Horticulture, Animal Industry, and special parts of the courses in Biology, Chemistry, and other related subjects.

Agriculture (Agronomy, or Crops and Crop Production) includes the study of subjects pertaining directly to farm crops and farm management. Horticulture deals with fruit, vegetable, and ornamental gardening, and the study of plant breeding. Animal Industry includes the work with domestic animals, dairying and poultry raising.

The purpose of the present bulletin is to give, somewhat in detail, the work of

THE DEPARTMENT OF HORTICULTURE

The Horticultural Department was established in January, 1891. From the first, the work of the department has been two-fold, — the work of instruction and that of investigation. These two lines are coördinate and supplementary. There is, perhaps, no branch of scientific or of practical work in which investigation and instruction may so well be combined, or are, in a measure, so interdependent.

The science of horticulture is in its infancy, though the practice is as old as the world itself, and he who would be a successful teacher must be, as well, an enthusiastic searcher after new truths. The most successful fruit-growers, gardeners, and florists are those who are ever on the lookout for lessons from the book of Nature, rather than those who depend upon books alone; those who investigate, prove, and disprove, rather than those who accept the dogmas of others.

EQUIPMENT OF THE DEPARTMENT

The equipment of this department comprises about fifteen acres of land devoted to orchards, gardens, small fruits, and nurseries, besides the University campus of about thirty acres, which is under the direction of the professor of horticulture, and which is used for practical instruction in landscape gardening. There are also four greenhouses, covering about 4000 square feet of surface, where the practical operations of growing flowers and vegetables under glass may be observed, and where material for use in the classroom is provided. These houses are also used for experimental studies in plant nutrition, pollination, soils, etc. The houses are heated by two modern hot-water heaters of different pattern, and the principles of greenhouse construction, heating, and ventilation are well illustrated. In the building adjoining the greenhouses, are the offices of the professor of horticulture and his assistant, a photographic studio, and a valuable herbarium of economic plants.

HORTICULTURAL INVESTIGATIONS

Some of the work of investigation has been detailed from time to time in publications of the Agricultural Experiment Station. The following list of bulletins and reports which have been issued from this department will indicate the scope of the work :

BULLETINS

- * No. 6. Fruit Culture — Varieties.
- * “ 8. Spraying Experiments for Apple Scab.
- * “ 9. Tomatoes.
- * “ 10. Cauliflowers.
- * “ 12. Potatoes, French System *vs.* Level Culture.
- “ 21. Notes on Small Fruits — Strawberries.
- “ 29. Notes on Spraying.
- “ 40. Celery.
- * “ 42. Ornamenting Home Grounds.
- “ 46. Ornamental Plants for Maine.
- “ 49. Care of Orchards.
- “ 52. The Spraying of Plants.
- “ 56. Apple Insects of Maine.
- “ 76. The Blueberry.
- “ 82. Orchard Notes.
- “ 89. Experiments in Orchard Culture.
- “ 95. Dandelion, Hawkweed, Ginseng, Canker Worms.

* Out of print

REPORTS.

- * Annual Report of the Experiment Station, 1891.

Experiments with Cabbages, Tomatoes, Egg Plants, Experiments in Spraying ; The Secondary Effect of Pollination (Fertilization of Flowers).

- * Annual Report for 1892.

Experiments with Cabbages, Tomatoes, Egg Plants, Potatoes ; Spraying Experiments.

- Annual Report for 1893.

Experiments with Cauliflower, Tomatoes, Egg Plants, Potatoes ; Spraying Experiments ; A Catalog of Maine Fruits.

- Annual Report for 1894.

Experiments with Tomatoes, Potatoes, Small Fruits ; Notes on Plant Breeding.

- Annual Report for 1896.

The Station Orchards ; Winter Gardening.

- Annual Report for 1897.

Ornamenting Home Grounds ; The Acquisition of Atmospheric Nitrogen by Plants.

- † Annual Report for 1898.

The use of Large *vs.* Small Radish Seed ; The Effect of Sub-Watering Radishes ; The Blueberry in Maine ; The Acquisition of Atmospheric Nitrogen, — Soil Inoculation ; Pollination and Fertilization of Flowers.

The earlier bulletins, most of which are now exhausted, are mostly brief summaries of the work which is detailed in the annual reports. As far as they are available, these publications are sent free to those who make application for them.

The work of investigation at present under way includes studies in orchard culture ; fertilizers for orchards ; top-grafting apple trees ; the spraying of orchards ; studies in germination ; studies in heredity ; problems in greenhouse management ; studies of the blueberry.

HORTICULTURAL INSTRUCTION

Horticultural instruction is given in a four years' collegiate course in horticulture, leading to the degree of Bachelor of

*Out of print

† Since 1898 annual reports consist of reprints of bulletins.

Science ; in the regular agricultural course ; in a special course of two years ; in the School Course in Agriculture ; in the short winter courses ; and in the extension work of lectures and correspondence.



A Lesson in Pruning.

The four years' course is designed primarily for those who wish to make some branch of horticulture a specialty, either as teachers, experiment station workers, fruit growers, or gardeners. All of the practical horticultural instruction given at the University may be obtained without taking the college course, but it is believed that the general training afforded by the full four years' course will prove of inestimable value in after life. In arranging this course a wide freedom of election has been allowed, but there are certain fundamental and so-called "culture studies" which must be taken. As far as possible the fundamental studies and the mathematics are taken during the first two years, so that students are fully prepared to get the most possible benefit from the technical courses.

The following schedule of studies will give an idea as to the nature of this course :

FIRST YEAR

FALL TERM

Biology
English
Drawing
Algebra
Chemistry
Military Drill

SPRING TERM

General Botany
English
Trigonometry
Solid Geometry
Chemistry
Military Drill

SECOND YEAR

English
Cryptogamic Botany
French or German
Chemistry
General Physics

English
Physiology
French or German
Chemistry
Horticulture

THIRD YEAR

Horticulture	Horticulture
Biological Chemistry	Entomology
German or French	German or French
Elective work, 8 to 12 hours a week.	Elective work, 9 to 12 hours a week.

FOURTH YEAR

Horticulture	Horticulture
Elective work, 10 to 15 hours a week.	Elective work, 9 to 14 hours a week.

The instruction in horticulture is given in nine courses, covering a period of two and one-half years, but many of those courses are based upon the principles studied in other departments. The following are the salient features of the distinctively horticultural work : General Horticulture, designed as a basis for all study of plants under cultivation ; Fruit Growing ; General and Ornamental Gardening ; Handicraft, practical work in orchards, gardens and greenhouses, accompanying classroom instruction ; Systematic Pomology ; Literature of Horticulture ; Evolution of Cultivated Plants ; Horticultural Investigations, for those wishing to become teachers or experiment station workers in horticulture. A detailed description of the courses is given in the catalog of the University.

The two-year courses are not differentiated from the regular college courses, but those who are fitted to take the professional work with profit are admitted to the classes with the regular students, and the professor of horticulture outlines an elective course to suit the needs of individual students.

In the School Course in Agriculture, which was fully outlined in the MAINE BULLETIN last year, one year's instruction in the principles of plant culture, in fruit growing, and in general gardening is given. This work is intensely practical, and is not of college grade, but the subjects are presented in the most helpful manner, for young men and women who are to make farming their life work.

Correspondence upon topics related to fruit growing and general gardening forms an important feature of the horticultural work, both in college and station lines, and every effort is made to keep in touch with the needs of the farmers of Maine.

HORTICULTURE AS A BUSINESS

In any line of work the highest success comes only to the man who has his heart in his work. This is doubly true of the horticulturist, and unless he loves his plants in orchard or garden or greenhouse, gives them personal care and thought, and notices their individuality and various requirements, he can not hope to rise above mediocrity. Plants are extremely sensitive and respond with a liberal reward to the attentions of a careful grower, but they are quick to resent ill-treatment or neglect.

If a man has a love for the business, there is no branch of agricultural work in New England which offers greater promise of reward at the present day than does fruit growing. But as ordinarily conducted, as a side issue in connection with general farming, the average orchard of the state is not very promising. Nevertheless, there is no feature of the farm which, with so little attention, gives such large returns. The average farmer, who complains of the low price of fruit when it brings \$1.00 per barrel, expends perhaps ten to fifteen cents per barrel for harvesting the fruit, thirty cents for the barrel, and ten cents for hauling to market ; leaving a net return of forty-five to fifty cents per barrel for fruit which has cost him practically nothing. This is not a large return, but it is larger than any other factor of the farm, with the same lack of attention, could

possibly return. It frequently amounts to \$30 to \$50 per acre and sometimes more. With the same attention as that given a crop of grain or hay, the income, even at the low price mentioned, will be far in advance of that from those crops. With better attention, however, and with the application of business methods to the harvesting and marketing, a much larger price for the fruit may be demanded and received.

As a business venture a wide awake enthusiastic man may make a wise and safe investment in fruit lands, at \$25 to \$40 per acre, with a certainty of securing liberal returns from his investment, and with the knowledge that the land is constantly increasing in value, as the trees approach full maturity.

Gardening and floriculture also offer inducements to the active, energetic, young man in the vicinity of Maine's cities and summer resorts. While returns are often larger from these pursuits than from fruit growing, competition is very sharp and the risks of loss are greater. The best of markets are available, however, and to one who will throw himself heartily into the work the field is an attractive one. Floriculture, especially, and also landscape gardening, offer attractive openings to young women who have a love for out-door life, or a special aptitude for the arrangement of plants, and good taste in decorative work. Landscape gardeners from Boston and New York find constant employment at our summer resorts, and a large proportion of the cut flowers sold in many of our cities come from Boston. These openings should be taken by our own people.

All things considered, the outlook is particularly good at the present time for efforts along horticultural lines in New England. Lands are cheap; markets are good, and are near at hand; transportation facilities by means of steamboats, railroads and electric cars are excellent, and are rapidly being extended; the markets of Europe are practically at our doors. The chances of success in any line will be increased in proportion as the young man or woman prepares himself or herself for the occupation before undertaking the responsibilities.

There are various ways of preparing for this work. One is by working for successful gardeners, florists, or fruit growers, and observing their methods. Another, and better way, is by taking a horticultural course in college. The college course, if rightly used, is the best possible preparation. The young man

is rounded out and broadened intellectually and is able to apply principles to his work and acquire a grasp of affairs which will make him a valuable citizen instead of merely a successful copyist.

Four years seems a long time to spend in preparation for a life work, but if rightly used these years may give information and training which it would require a longer time and many reverses to secure from practical experience.

There is, however, an increasing call for well equipped men to take charge of country estates, and to manage large orchards and greenhouse plants, at liberal salaries. The college graduate, other things being equal, is always sought for such responsible positions in preference to the man who has had only practical experience. If a man is better fitted to work for another, as a result of college training, he is certainly better fitted to work for himself.

There is also an urgent demand for teachers and investigators of horticultural subjects. The young man who fits himself for such work is just as surely serving the advancement of agriculture as if he went back to the practical business of raising potatoes or apples or cabbages. The four years' course in Horticulture at the University of Maine is designed to help young men for either practical or scientific work.

HORTICULTURAL EDUCATION

The standing of any business or profession depends upon the character and quality of the men engaged in it. This being the case, the only way we can hope to maintain the dignity of work pertaining to the cultivation of the soil, and encourage the rising generation to look favorably toward that calling, is by showing that there is quite as good an opportunity for the exercise of the best powers of thought and business ability as in any other calling in life. Mere platitudes regarding the freedom and independence of the farmer, and the joy of being "near to Nature's heart," have very little weight in these days of competition and struggle and mental and social awakening.

The claim is often made that the agricultural colleges of the country educate boys away from the farm; that the farmer can not profitably spend four years in preparing for his work and then go back and take up the burden which his father laid down; that as soon as the boys get out of college they will

take up some other line of work which will insure them an immediate return somewhat larger than the old farm will yield. At first thought there seems to be an element of justice in this claim. In a vast majority of cases the farm boys who are graduates of the State colleges of the country do follow some other pursuit than that of agriculture. But is it their college education which induces this change of sentiment or of occupation? In nine cases out of ten the boy has been educated away from the farm while still under his father's roof. He has seen that farming in the old way is confining, is laborious, is slow of returns and is altogether unsatisfactory. He enters college with the express purpose of taking an engineering course or a scientific course and thus fitting himself for some other pursuit. From the very first time he enters the public school, his education is all *away* from the farm.

In these days a farmer needs training and broadening and developing quite as much as does a lawyer, a doctor, or an engineer. But this training and broadening may be given by means of studies which shall have a more direct bearing upon daily life than is the case with Greek, Latin and Calculus. The most successful man is he who has the ability to reach out into a broader social and intellectual sphere; to think and reason and act with assurance. Such a man will succeed whether he be on the farm, in the schoolroom or in the counting-house.

There is a large element of uncertainty in all agricultural operations. What with changing weather conditions, untimely frosts, varying soils, uncertain germination, fungous and parasitic diseases, injurious insects, birds and animals, there would seem to be no end to the list of "unsolved problems" which the farmer must meet. To solve these problems would seem almost a hopeless task for any one—especially for a "theorist" in the class-room.

What, then, is the use, or the reason for the existence of agricultural college and experiment station? A thorough study of the laws of nature as applied to agriculture will reduce the uncertainties to a minimum, and will raise the possibilities of production to a maximum. The college brings to bear all of the sciences related to the subject. Botany, chemistry, geology, entomology, bacteriology, and many others, are all made to contribute to the practical solution of the difficulties to which farmer and gardener and fruit grower are heir. There are

causes for poor crops which may be overcome ; there are diseases of plants and animals which may be prevented and cured ; there are physical and chemical and geological conditions which may be met intelligently and successfully ; there are processes to be discovered and taught that may promote productiveness when applied to specific crops.

There has, heretofore, in the language of one of the leading educators, been "too little intellect and too much luck in the practical operations of agriculture and horticulture. There has been too little live investigation and too much following in the rut made by others. The enhanced power to produce comes from an intellect that commands the elements and harnesses the laws of nature. The power to *produce* is in the earth ; the power to *increase* that production is in man."

To aid men to get out of the rut followed by others, and to enhance the power to increase production, is the mission of the agricultural colleges and experiment stations of the present day. Just how this may best be accomplished is the problem which confronts thoughtful educators at the present time. In the opinion of those who give the matter careful attention, it is not the cramming of the mind with an array of *facts* which will be most beneficial. It is the appreciation of cause and effect ; the growth of mental power ; the ability to discriminate. There is a loud call for "practical" instruction from all sides. But the most practical instruction is that which makes an all-round man. This is an age of specialists, but the specialist must have something on which to build

The teaching of the practical only is narrowing in its tendencies. It makes men of one idea,—incapable of talking intelligently on other subjects. The power of acquiring knowledge is of infinitely more value than a mere medley of isolated facts. It is for this reason that the full college course is superior to a short cut to horticultural knowledge or, indeed, to any other short course of instruction.

The first question which confronts every thoughtful teacher of horticulture is : What shall be the scope of the instruction ? Shall the course be restricted to the so-called practical problems attending the propagation of fruits and vegetables, or shall it be made to include the wider field of landscape gardening, plant breeding, and the application of the laws of vegetable physiology ? Shall we study the art of raising

plants, or shall we consider the principles on which the art is founded?

A course in horticulture which is restricted to the mechanical operations of the propagation and culture of plants is incomplete and unsatisfactory. The student should know something of the origin, habits, and relationships of plants, also of the causes of variation, and the effects likely to be produced by the operations he may perform. In other words, he should know something about plants and their improvement, as well as something about their cultivation, handling, and marketing. For this reason, as well as to train the powers of observation, a thorough knowledge of systematic, structural and physiological botany should be at the foundation of every college course in horticulture. A knowledge of agricultural chemistry, of elementary physics, and of soils, is also essential, for reasons which are apparent, and this work should precede technical instruction in horticulture. With this fundamental basis, the practical details may be very quickly acquired.

Accepting this view, technical horticultural instruction can not well begin before the third year of the course, except as a general survey of the field, with a discussion of the principles of plant culture, may be given. By this time the student will have had sufficient training to understand the distinguishing characters and the relationships between the different fruits and vegetables studied, and the knowledge of soils, drainage, and agricultural chemistry, upon which practical discussions are based.

Without referring to details, it may be said that text-book instruction in horticulture is usually unsatisfactory. So also, in teaching horticulture by means of lectures, something more than mere talking is required to maintain interest. Actual demonstration is necessary. It is not a question of what results should be obtained; how many bushels of potatoes or onions or apples should be grown on each acre; but what are the methods and why? What are the principles involved? Practical demonstrations may be conducted either at the college or at a commercial orchard, garden or greenhouse—preferably at the commercial establishment.

Laboratory work and collateral reading should be made an important feature of every course in horticulture, as the student retains more lasting impressions from the free, informal

discussions attending the demonstrations than from the most carefully prepared lectures. The laboratory work should, however, be as thoroughly systematized as the classroom instruction and, as far as possible, should follow the same line taken up in the lectures.

Much has been said and written concerning the ideals of education. The true philosophy of life is to idealize everything with which we have to do. "Success lies not so much in doing unusual things, as in doing usual things unusually well." "If a man's work in life has to do with potatoes or apples, let him *know* potatoes or apples. Let him analyze their structure, follow the germinating seed or sprouting tubers or bursting buds; study the influence of sun and rain and heat and air. Let him know the soil in which his plants grow, whence it came, of what it is composed, how it may be varied. Let him understand the forces set at work when the plow is first employed; the chemical and physiological and biological changes that occur. Let him, by the aid of the microscope, see the organisms that are helpful to him in his work, and those which he is to subdue. Let him become familiar with the friends and foes among the hordes of insect and bird and animal visitors to his orchard and garden. Let him know the relation which his chosen plants bear to their fellows. Let him work among and study his plants, learning their individuality and their possibilities. Let him till the ground for the sake of tillage and not simply as a never ending struggle against the curse of weeds. Let him do all this and he ceases to be simply the "man with the hoe," and becomes one of Nature's yeomen. He learns to love his work and will use the force of his trained and sharpened faculties in the improvement of methods until he shall revolutionize potato growing or apple raising.'

From what has been said it must not be supposed, however, that the only horticultural instruction that may be given is of college grade, and that a full college course is essential for every young man if he is to succeed in the practical work of fruit growing or gardening. Within the past few years there has been a wonderful development of agricultural instruction in all parts of the country. The movement for the establishment of secondary schools, and of special courses suited to the requirements of rural conditions in many high schools, is rapidly going forward, and it is to be hoped that Maine will push well

to the front in the forward movement. The college courses should, however, be kept entirely distinct from the secondary work, and should imply much more thorough training. College graduates and college instructors may be able to give invaluable assistance in developing the secondary work, but that work is of a different, though none the less important, type.

An important mission of horticultural education, and this need by no means be of college grade, is the creation of a new sentiment, a new atmosphere, about rural homes and rural affairs. Children from the farm are often prejudiced against the farm from their earliest period of recollection. They feel instinctively that their lot is less attractive than that of their city cousins. As they go to the towns and villages to attend high school, or academy, this feeling of dissatisfaction is increased.

There is no doubt that a smooth lawn and a well kept house, or the contrary, may have quite as much influence in determining the future of the boys and girls from farm homes as the amount of hay per acre or the number of cows in the herd. If farm life is made interesting, farm homes and surroundings made attractive, farm boys and girls will become enthusiastic, activity will be stimulated and profit will follow. This is not mere sentiment, but a statement of fact which should appeal to the business sense of every farmer in Maine.

The mission of horticultural education then, especially in New England, is, in addition to college instruction, by means of lectures, institute work, bulletins, and correspondence, to stimulate the desire for better conditions in our rural homes; to point out the possibilities before young men and women in the direction of improved rural conditions and of intensive culture of fruits and vegetables and flowers from a practical point of view; to welcome to a broader field and higher training those who would fit themselves for leaders in either practical or scientific work along horticultural lines; to solve by careful experiment some of the problems which confront gardener, fruit grower, and home-maker.

Inquiries concerning any of the horticultural work should be addressed to

Professor W. M. MUNSON,
Orono, Maine.

For general information concerning the University, address
President GEORGE EMORY FELLOWS,

Orono, Maine.

For general information concerning the Experiment Station,
address

Director CHARLES D. WOODS,
Orono, Maine.



The University of Maine

College of Agriculture

Short Winter Courses

Agriculture, Horticulture, Dairying

The usual courses for farmers who wish to avail themselves of the advantages offered at the University, will begin JANUARY 3, 1905, and will continue eight weeks. The greatest possible amount of information will be given in the time allotted.

The following practical subjects will be discussed by practical men :

Plant and animal nutrition; crops and crop production; farm management; orchard culture; small fruits; spraying; insects and plant diseases; animal breeding, feeding and diseases; dairying; dairy practice; soils and fertilizers; farm drainage.

TUITION IS FREE, and there is practically no expense except for room and board. The whole expense for the course need not be more than forty dollars.

Full information will be furnished upon application to

President GEORGE E. FELLOWS,

Orono, Maine